Space Weather Technical Forecast

Issued on Thursday 30 January 2025 at 13:29 Local

This technical forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

---

Space Weather Forecast Headline: Chance of isolated M-class flares. G1 minor geomagnetic storms likely 31 Jan due to onset of CH11 fast winds.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Low, with only C-class flares observed, peaking at C6.5 at 30/2246 UTC, and originating from AR3978. This is one of seven regions on the disc, however the majority of these these are small and simple with only limited growth. The main development is currently with a new region in the southeast disc, and the regions AR3977, AR3978 and AR3976 which form a tight cluster of sunspot groups in the northeast disc.

No Earth-directed CMEs have been observed.

Solar Wind / Geomagnetic Activity: Background slow wind conditions were observed, but with a possible weak transient influence 29/2100 UTC onward. Solar wind speed, as measured by DSCOVR at L1, was at background, easing from 350km/s to near 300km/s. Density was average at first, but rose to be above, reaching 30ppcc. Interplanetary Magnetic Field, Bt, was Weak to Moderate, peaking 13nT at 31/0410 UTC. The north-south component, Bz, was weakly southward at first, near -5nT, but became weakly to Moderate and northward with the transient passage, peaking 9nT. Phi angle was indeterminate at first, but became predominately positive from 30/2100 UTC. Geomagnetic activity was Quiet throughout (Kp 0-2).

Energetic Particles / Solar Radiation: High energy proton flux at GOES18 was at background. High energy electron flux (greater than 2MeV) at GOES16 was at Background. The associated 24-hour fluence persisted below the Active threshold, recording 1.28e6 integrated pfu at 30/0000UTC.

Four-Day Space Weather Forecast Summary

Solar Activity: Low to Moderate expected, with a chance of isolated M-class flares, primarily from the regions on the northeast disc.

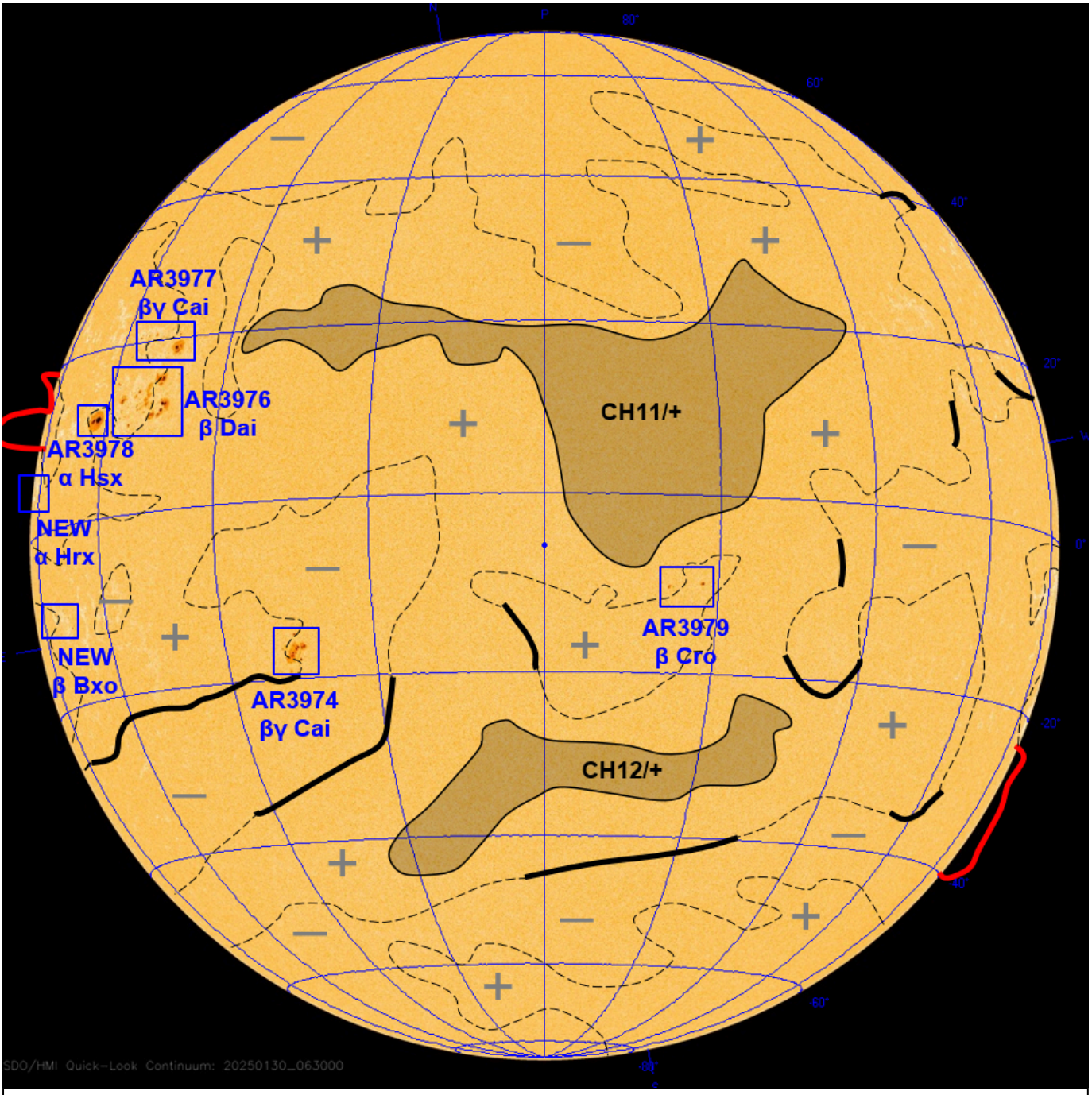
Solar Wind / Geomagnetic Activity: There are no Earth-directed CMEs, with the outlook dominated by the large recurrent coronal hole, CH11/+, in the north centre disk, with onset of fast winds most likely day 2 (31 Jan). Quiet activity (Kp1-2) is expected initially, but increasing to give a likelihood of Active to G1 Minor Storms, and a slight chance of G2 Moderate Storms, most likely on day 2.

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 370 900 0100 Email: enquiries@metoffice.gov.uk

© Crown Copyright 2025. All Rights Reserved.

Energetic Particles / Solar Radiation: GOES18 high energy proton flux is expected to be at background. GOES16 high energy electron flux is expected to remain at background, but with a rising trend later in the period perhaps peaking at High later day 4 (02 Feb). The corresponding 24-hour fluence is expected to remain below the Active threshold.

Figure 1: MOSWOC Synoptic Map 30/0800 UTC



Key: Filament ___ , Prominence ___ , Magnetic Field Line - - - , Polarity +/-, Coronal Holes: Grey shaded area CHxx +/-, Sunspot groups 25xx - Mt Wilson α-β-βγ-βγδ and Zurich-McIntosh Axx etc.

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 370 900 0100 Email: enquiries@metoffice.gov.uk

© Crown Copyright 2025. All Rights Reserved.

Geomagnetic Storms

No Earth-directed CMEs.

The current forecast is dominated by the large recurrent coronal hole, CH11/+, near centre disk. This feature is expected to bring an increase of solar winds from current background levels towards elevated or strong levels, 550-650km/s, from later day 1 (30 Jan) or more likely through day 2 (31 Jan). This is supported from both recurrence and MOSWOC ENLIL model output, although MOSWOC ENLIL is likely bringing in these fast winds slightly too soon. Solar wind speeds are then expected to remain at elevated or strong levels through day 3 and 4 (01-02 Feb), but on a slow declining trend, perhaps falling to slightly elevated levels by the end of day 4.

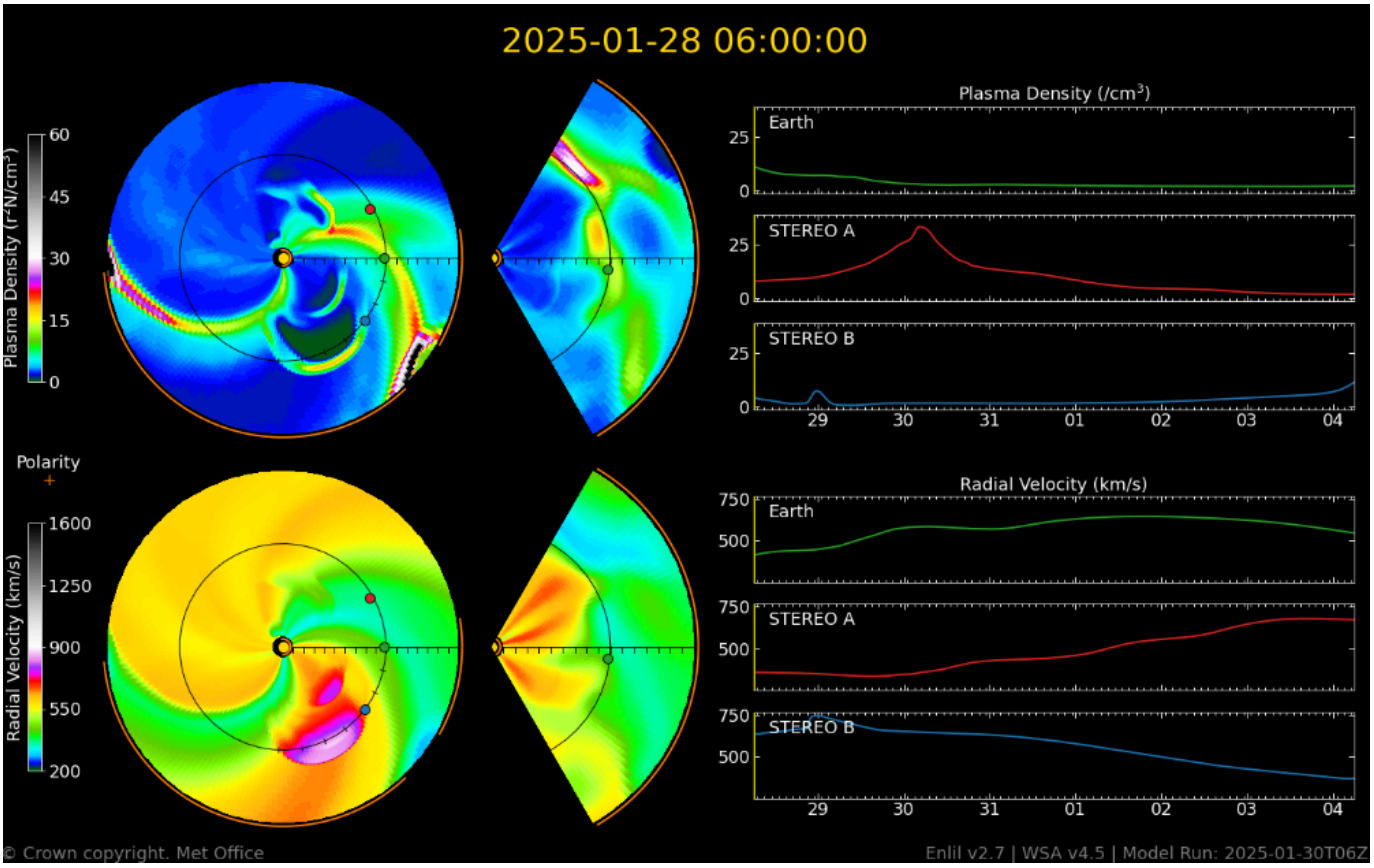
Generally Quiet activity (Kp1-2) expected initially. Activity expected to increase to become generally Unsettled to Active (Kp3-4) from late Day 1 (30 Jan) onwards, with the slight chance of G1 minor storm increasing, with Active to G1 Minor storms likely day 2 (Kp4-5), with a chance of isolated G2 Moderate Storms, before easing day 3-4 to be mainly Quiet to Active by the end of the period (Kp 1-4).

Geomagnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	20	60	30	10
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 370 900 0100 Email: enquiries@metoffice.gov.uk

© Crown Copyright 2025. All Rights Reserved.

Figure 2: MOSWOC Enlil



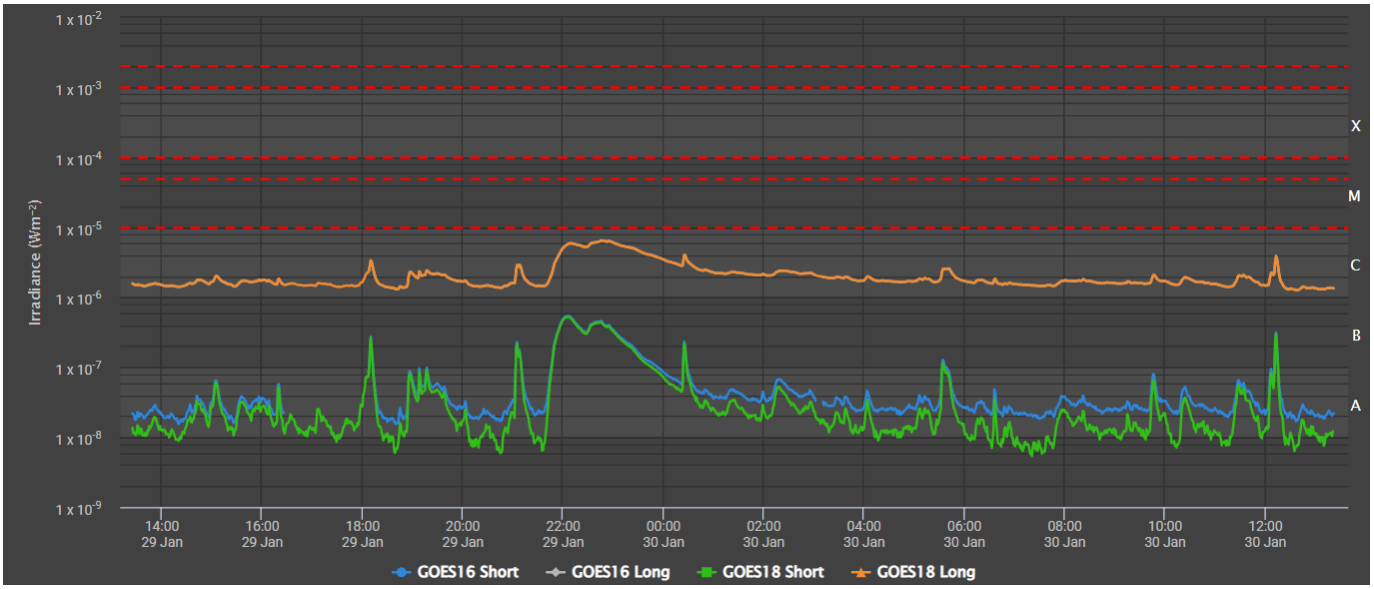
© Crown Copyright 2025. All Rights Reserved.

Radio Blackouts - X-Ray Flares

There are currently seven sunspot regions visible on the Earth-facing side of the Sun. AR3976, AR3977 and AR3978 have recently emerged from the north-eastern limb and represent the bulk of current activity and magnetic complexity, warranting further analysis as they move further onto the solar disc. Two further regions have also emerged over the eastern limb, however these currently appear small and magnetically simple. The remaining other two sunspot regions on the the disc are also small and magnetically simple

X-Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 (M Class)	No	50	60	60	60
Very Active	R3-R5 (X Class)	No	5	5	5	5

Figure 3: GOES-16/18 X-ray Irradiance



Issued by Met Office Space Weather Advisor, Tel: +44 (0) 370 900 0100 Email: enquiries@metoffice.gov.uk

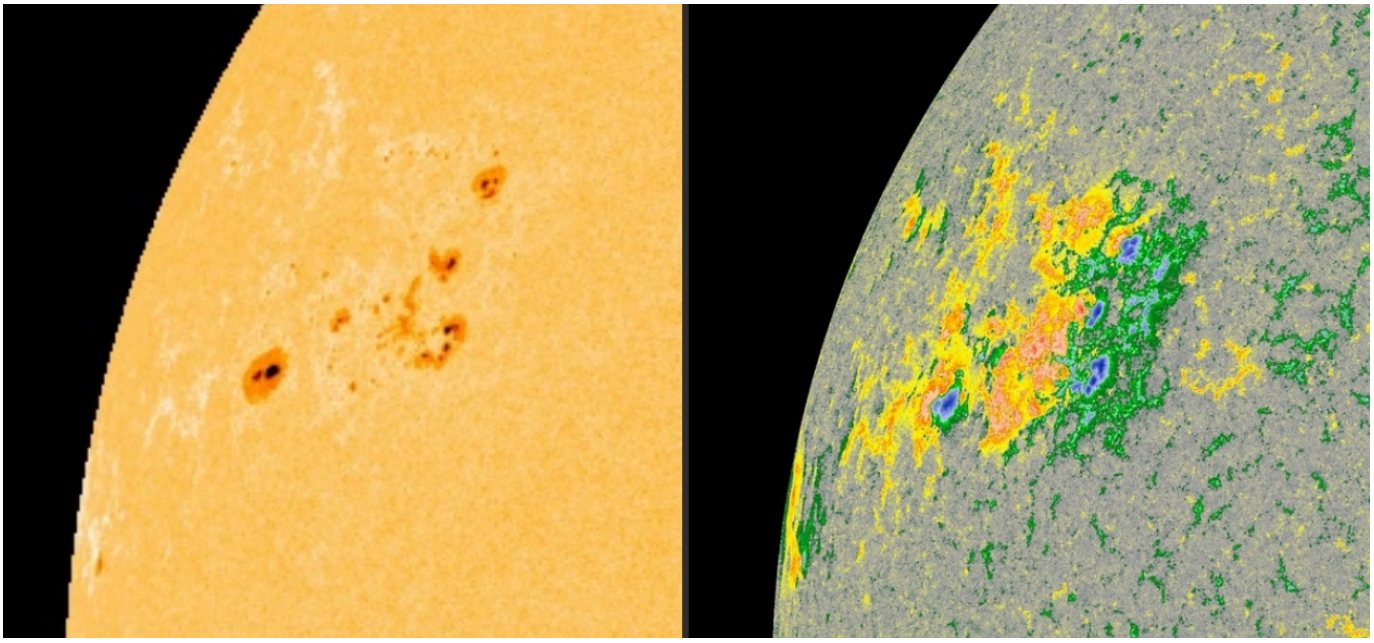
© Crown Copyright 2025. All Rights Reserved.

Solar Radiation Storms (High Energy Protons)

Proton flux as observed by GOES-18 is currently at background and with the majority of the current solar activity on the northeast disc.

Radiation Storms Probability (Exceedance)	Level ($cm^{-2}sr^{-1}s^{-1}$)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	No	5	5	5	5
Very Active	**≥ S3 ***	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and/or 50 MeV ≥ 10pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

Figure 4: SDO Intensitygram and Magnetogram of NE Disc



Issued by Met Office Space Weather Advisor, Tel: +44 (0) 370 900 0100 Email: enquiries@metoffice.gov.uk

© Crown Copyright 2025. All Rights Reserved.

High Energy Electrons (≥ 2MeV)

High energy electron flux observed at GOES16 has been at background and expected to persist at similar levels through days 1-3 (30 Jan-01 Feb). A rising trend is then likely, due to the charging of the Van Allen Belts from the arrival of CH11/+ fast winds later day 1 or day 2. This could bring Moderate, with a chance of High flux, by the end of the period.

The corresponding 24-hour fluence is expected to remain below the Active threshold. MOSWOC REFM is felt to be giving good guidance, however a rising trend is expected by day 4 (02 Feb).

GEO Electron Environment Probability (Exceedance)	Level ($cm^{-2}sr^{-1}$ day^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ 2 MeV ≥ 1×10^{8}**	No	1	1	1	10
Very Active	**≥ 2 MeV ≥ 1×10^{9}**	No	1	1	1	1

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 370 900 0100 Email: enquiries@metoffice.gov.uk

© Crown Copyright 2025. All Rights Reserved.